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ABSTRACT

The purpose of this study was to analyze the verbal interactions of children assigned to multiage classrooms. Specifically, the study investigated whether children of a particular age group interact with other children across age groups and the types of interactions each age group display. It also investigated student-to-teacher interactions and student-to-student interactions to see if interactions initiated by children are dispersed across age groups. An interaction in this study is defined as a verbal exchange between two children or between a child and the teacher. Groups studied consisted of classrooms containing children of two ages (e.g., six- and seven-year-olds) and groups containing children of three ages (e.g., eight-, nine-, and ten-year-olds). When three ages were combined in a classroom, the older children tended to dominate the conversation directed to other children in the class. This tendency was not present when two ages were combined. Combining children of different ages in classrooms did not result in any age dominating the teachers' attention. When three ages were combined in a classroom interaction seldom occurred across age groups, but when it did occur it was initiated by children in the middle age grouping. Multiage classrooms composed of two ages combined resulted in random interaction across age groups. Appended to this document are tables presenting data resulting from the research. (JD)

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STATE UNIVERSITY OF NEW YORK COLLEGE AT CORTLAND

AN ANALYSIS OF VERBAL INTERACTION IN MULTIAGE CLASSROOMS

by

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August 1977

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AN ANALYSIS OF VERBAL INTERACTION IN MULTIAGE CLASSROOMS

INTRODUCTION

The purpose of this study is to analyze the verbal interactions of children assigned to multiage classrooms. Specifically, the study investigates whether children of a particular age group in a multiage classroom interact with other children across age groups and the types of interactions each age group displays. It also investigates student-to-teacher interactions and student-to-student interactions to see if interactions initiated by children are dispersed across age groups.

Multiage grouping, which is sometimes referred to as multigrading, is the heterogeneous grouping of children by age (grade). A multiage classroom is one in which children whose ages span two or three years (occasionally even more years) are placed together without consideration of their levels of ability or achievement. For example, a classroom might include 9 and 10 year olds; or 6, 7 and 8 year olds; or 8 and 9 year olds. Multiage grouping is not contingent upon any particular educational theory or practice but refers only to the classroom organizational structure.

BACKGROUND OF THE PROBLEM

Multiage classes were quite common in the earlier days of United States education particularly in rural areas where school districts had small student populations. An increasing

student population plus the consolidation of school districts resulted in institutions adopting a single graded structure and multiage grouping almost disappeared from the educational scene. In recent years educators have taken a renewed look at multiage grouping which has resulted in their seeing some desirable educational reasons for using this classroom arrangement.

Proponents of multiage grouping (Brown & Precious, 1968; Ridgway & Lawton, 1973) argue that it increases children's security because the academic setting remains stable for the two or three years that a child remains in one classroom. They contend that multiage grouping fosters the socialization of the younger children who are joining an established group of children, a group in which the younger children may already have experienced friends. Another beneficial effect attributed to multiage grouping is the mutual aid which children consciously or unconsciously give to each other. According to this theory, the leadership skills of older children are fostered as they help the younger children. The younger children, in turn, are supposed to learn from the older children.

Proponents also reason that multiage grouping permits variations in personal growth. During the activities part of the day, children can work with other children exploring similar interests regardless of their levels of development. The type of interaction which can be permitted in multiage classrooms is believed to be conducive to learning.

There are some underlying assumptions which are related to these arguments. For example, it is assumed that teachers of multiage classes provide an environment in which children are allowed to choose with whom they wish to interact. Once given this choice, it is assumed that children in multiage classrooms will interact with one another across age groups. It is also assumed that student-teacher interactions will occur randomly without regard to the age of the children.

LITERATURE REVIEW

Most of the research on multiage grouping has concentrated on achievement, self-concept, and attitudes toward school (Hamilton & Rehwoldt, 1957; Hoen, 1972; Junell, 1971; Mycock, 1967; Samuels, 1969). The evidence at this time seems to indicate that multiage grouping is desirable or, at least, has no deleterious effects on the achievement and self-concepts of children.

The only study found in the literature which focused on the verbal interactions of children in multiage classrooms was one by Day and Hunt (1975). These researchers analyzed the communication that occurred in four multiage grouping settings composed of 4, 5 and 6 year olds. One of the four settings was a state supported school in a research center while the other three settings were in public elementary schools. According to the authors, the children in the first setting were allowed to interact freely but children in the public school settings were often grouped by ability

and asked not to talk. Also, children in the first setting were free to work in whatever classroom activity center they wished. In the other three settings, teachers assigned children to groups and often gave them graded tasks to perform. These differing environmental factors may have accounted for the differences these researchers found among the settings. The children did not direct their communication randomly across age groups in the public school settings; however two of the three age groups directed their communication randomly in the research center school. Even in the research center school, the 6 year olds did not direct their communication randomly across ages. From this study of 4, 5 and 6 year olds in multiage classrooms, it appears that simply grouping children together heterogeneously by age does not necessarily result in interactions occurring across age groups. Day and Hunt (1975) did find the student-to-teacher interactions to be random in all of the settings.

The interactions of children in multiage classrooms needs to be explored more fully. For example, the interactions of children in other multiage grouping arrangements has yet to be explored. These would include multiage classrooms composed of older children and classrooms where only two ages are grouped together. There are also other factors related to the verbal interactions of children which need to be examined. The types of interactions children of various ages initiate is one factor. Another factor is

whether a particular age group dominates the classroom conversation. The current study attempted to examine the interactions of children in a variety of multiage grouping arrangements for several different factors.

STUDY DESIGN

Research Questions

As already stated, the purpose of this study is to analyze the verbal interactions of children assigned to multiage classrooms. The study addresses itself to the following research questions:

1. Is there a difference in the proportion of interactions initiated by children of various ages to other children in multiage classrooms?

It might be speculated that there would be a difference in the amount of conversation initiated by various aged children in multiage classrooms. The children who had been in a particular multiage classroom for the second or third year might have more confidence than the children who were newcomers to the teacher and classroom setting.

2. Is there a difference in the proportion of interactions initiated by children of various ages to the teacher in multiage classrooms?

While the first question focuses on interactions directed to other children, this question focuses on interactions directed to the teacher. Day and Hunt (1975) examined this question in a study of multiage classrooms

composed of 4, 5 and 6 year olds. They found no differences between the observed and expected frequencies for student-to-teacher interactions in their study. Combining 4, 5 and 6 year olds did not result in any of these ages dominating the teacher's attention. The current study will examine this factor for other multiage classroom arrangements.

3. Do children of each age in multiage classrooms interact with other children across age groups?

The first research question is directed at analyzing the conversation initiated by all children in multiage classrooms to see if it is randomly dispersed across ages. The possibility that a particular age, e.g., the oldest children, might be initiating most of the conversation in multiage classrooms is explored. This third question examines each age separately to see if the conversation that is initiated by the age under examination is randomly directed to other children across age. For example, in a classroom of 9, 10 and 11 year olds, are the interactions initiated by the 9 year olds directed randomly to the other 9, 10 and 11 year olds?

The Day and Hunt (1975) study of multiage classrooms composed of 4, 5 and 6 year olds found high interaction within age groups and low interaction between age groups. In other words, the 4 year olds in their study directed a greater proportion of their conversation to other 4 year olds than was directed to 5 or 6 year olds. The current

study examines this factor for other multiage classroom arrangements.

4. Can the interactions between children be classified into definable types?

One of the arguments for multiage grouping presented by Ridgway and Lawton (1969) was the mutual aid which children give to each other. Specifically, they mention the "teaching" which the older children provide for the younger children. In the current study, an attempt was made to classify the interactions of children in some meaningful way which would reflect the giving and receiving of advice/assistance. If it were possible to classify the interactions of children, the interaction types could then be studied in multiage classrooms.

5. Is there a difference in the proportion of interaction types initiated by various aged students to other students in multiage classrooms?

If the interactions of children can be classified in some way reflecting the giving and receiving of assistance, then it would be possible to examine whether the older children are giving the advice/assistance and the younger children are receiving it.

This study addresses itself to the above research questions. The study was conducted in two different school settings. These school settings have a variety of multiage grouping arrangements for the ages of 3 through 11.

For the purposes of this study, an interaction is defined as a verbal exchange between two children or between a child and the teacher. A complete interaction includes the first remark by the initiator and the corresponding response by the receiver. Two very widely used and understood nonverbal actions are considered to be part of an interaction. These nonverbal actions are the negative and positive head shakes. The act of supplying a requested object is also included as part of an interaction.

Populations

This study was conducted in two settings which comprise two different populations of children. The first setting was a laboratory school located on a college campus. No fees are assessed for the children enrolled in the laboratory school and all children between the ages of 3 and 11 in the central New York area are eligible to enroll. A lottery is conducted each year for new applicants to fill openings. As a result, there is a cross section of the local community represented in the school. Ten per cent of the children have parents who teach in the college. At the time this study was conducted, multiage grouping had been operational for seven years at this school. Several special programs are being demonstrated in this laboratory school and the philosophy of the staff is generally toward open education.

There are two kinds of teachers in the laboratory school: family room teachers and interest area teachers. The

responsibilities of the family room teachers vary somewhat depending upon the kind of program they are demonstrating but all of them are responsible for teaching basic skills. Furthermore, each family room teacher is responsible for a specified group of children for the entire day even though the children may not stay in the teacher's classroom for all of their day. If the teacher had been assigned 6, 7 and 8 year olds, then a 6 year old assigned to this teacher would remain in that teacher's classroom for three years. Interest area teachers, on the other hand, teach a specialty, e.g., physical education, industrial arts, foreign languages, or art. Children are allowed to choose interest areas they wish to attend each week so the populations in these classrooms are generally very fluid.

The data for this study were collected in family rooms which had three ages of children grouped together. The early childhood classrooms contained 3, 4 and 5 year olds; the primary classrooms contained 6, 7 and 8 year olds; and the intermediate classrooms contained 9, 10 and 11 year olds. While not directly part of this study, data also were collected in one interest area classroom and in the lunch room. The results for these special areas are reported in Appendix A.

The second setting was a suburban school district in another locality. There are four elementary schools in this school district and each school has both single grade and multiage (multigrade) classrooms. Sixteen of the twenty-nine elementary classrooms in this school district

are multiage classrooms. The children assigned to multiage classrooms in this school district have been volunteered by their parents who were interested in having their children involved in this classroom arrangement. Multiage grouping was in its second year when this study was conducted. Table 1 shows the configuration of multiage classrooms in this school district.

TABLE 1

Configuration of Multiage Classrooms in Suburban School District

Classroom Age Combination	Equivalent Grades	Number of Classrooms
6 - 7 year olds	1 - 2	5
7 - 8 year olds*	2 - 3	1
8 - 9 year olds	3 - 4	2
9 - 10 year olds	4 - 5	3
8 - 9 - 10 year olds	3 - 4 - 5	5
	Total	16

*Not used in study

The single classroom of 7 and 8 year olds was eliminated from the study in an effort to protect the confidentiality of the teacher and because the single classroom would have to be observed many times in order to collect sufficient

data for analysis. Data were also collected in several interest area classes in the suburban school setting. A science class composed of 7, 8, 9 and 10 year olds was of particular interest since four ages were combined into one classroom. The results for these interest area classes are reported in Appendix B.

It should be noted that the multiage classrooms in the suburban school setting are referred to by school personnel in terms of grade combinations rather than age combinations. The laboratory school does not use grade designations for any of their classes. In an effort to be consistent throughout this report, all classes are referred to by their age composition. For added clarity, the tables for the suburban school setting contain both the classroom age compositions and the grade equivalents. Appendix C contains the number and composition of classrooms observed in each setting as well as the number of children in each classroom observed for this study.

Instrumentation

Two forms for recording data were developed (Appendix D) and two observers were trained to record the interactions of children onto these forms. The observers recorded the interactions of children verbatim as well as the ages (grades) of the initiator and receiver for each interaction. They also recorded the number of children in each age group who initiated interactions to the teacher and the number of children present in the classroom by age grouping. A third

form was developed to organize the collected data by age and to provide a system for recording the classification for each interaction (Appendix D).

Data Collection Procedures

The data were collected by two trained observers using Forms A and B. Each classroom selected for this study was observed for 30 minutes by both observers and the interactions of children were recorded verbatim. The observers stationed themselves in different parts of a classroom to avoid overlapping of collected data. They also recorded the ages of the children initiating and receiving each interaction, the number of children in each age group who initiated interactions to the teacher and, finally, the number of children in each age group who were present in the classroom. A time schedule was arranged with each teacher so that data could be collected during classroom activities which allowed children to interact freely. Most classrooms were observed three separate times and the rest were observed twice (Appendix C).

One of the research questions propounded by this study is whether the interactions of children can be classified by a system which reflects the giving and receiving of advice/assistance. A classification system was devised which contained three classification categories. These categories are labeled dominant interactions, submissive interactions, and neutral interactions. The categories are defined in the following way:

Dominant Interaction: The initiator gives a command or gives unsolicited advice/help (D) and gets acquiescence (S) or a neutral (N) response from the receiver. D→S or D→N

Submissive Interaction: The initiator requests help from the receiver (S) and gets advice/help (D) or a neutral (N) response from the receiver. S→D or S→N

Neutral Interactions: The initiator gives a command or gives unsolicited advice/help (D) but does not get acquiescence (D) from the receiver. D→D or

The initiator requests help from the receiver (S) but does not get advice/help (S) from the receiver. S→S or

Verbal exchanges which do not fit into the other two categories.

Below are examples of the kinds of interactions which would fit into these three categories.

Dominant Interactions D→S or D→N

Initiator: "Give me that pencil."
Receiver: "Okay" or gives the pencil

Initiator: "You are not doing that right."
Receiver: "How should it be done?" or "Why not?"

Initiator: "We are supposed to do it this way."
Receiver: "Okay" or "I guess so."

Submissive Interactions S→D or S→N

Initiator: "How are we supposed to do this?"
Receiver: "Mr. Smith said to do it like this?"

Initiator: "Can you help me with this?"
Receiver: "Okay" or "No"

Initiator: "Oh no, I forgot my book."
Receiver: "If you hurry, you can still get it."

Neutral Interactions D→D, S→S, N→N

Initiator: "Give me that pencil."
Receiver: "No."

Initiator: "You are not doing that right."
Receiver: "Ms. Jones told me to do it this way."

Initiator: "We are supposed to do it this way."
Receiver: "No, we're not."

Initiator: "How are we supposed to do this?"
Receiver: "I don't know."

Initiator: "Can you help me with this?"
Receiver: "I don't know how to do it either."

Initiator: "Oh no, I forgot my book."
Receiver: "That's too bad" or "Now what are you going to do?"

Initiator: "I like to draw pictures."
Receiver: "Yeh, it's fun."

Initiator: "My cat had kittens last night."
Receiver: "Kittens are cute."

Four judges were used to classify the recorded interactions between children. Each judge received a copy of the interactions as recorded on Form C (Appendix D); however the identifying codes and the ages of the children had been removed from the judges' copies. When each judge, working individually, had classified all recorded interactions, the results were summarized by the following method. If all of the judges or three of the four judges had agreed on a categorization, the interaction was labeled according to this categorization. For example, if three judges categorized an interaction as "dominant" and one judge categorized the interaction as "neutral", the interaction was labeled as a "dominant" interaction. Any other configuration of the categorizations made by the judges for an interaction was considered unclassifiable.

A pilot test was made from interactions collected in two classrooms not used in the study. The pilot test revealed that there was enough agreement among judges to warrant studying the classification system as defined. The judges then proceeded to categorize all the recorded interactions and the data were processed as described above.

Data Analysis Procedures

To answer the first three research questions, the chi square one-sample test of significance was utilized to analyze the data. The expected frequencies for these tests were determined from the proportion of children present in each age grouping.

It was decided that the judges should agree on the categorizations of at least three-fourths of the interactions for the classification system to be considered usable. If 75% or more of the interactions were classifiable, then the data related to the last research question would be analyzed. The chi square test of significance for independent samples was used to analyze the data on types of interactions initiated by various age groups. The .01 level of significance was utilized in all of the statistical testing for this study.

FINDINGS

The presentation of the findings is organized around the five research questions under consideration in this study. Under each research question, the results will be reported separately for the two school settings.

Is there a difference in the proportion of interactions initiated by children of various ages to other children in multiage classrooms?

As stated earlier, only those classrooms which spanned three ages were included in the study. Therefore, the early childhood classrooms contained 3, 4 and 5 year olds; the primary classrooms contained 6, 7 and 8 year olds; and the intermediate classrooms contained 9, 10 and 11 year olds. The data were analyzed for each of these age ranges separately. Then all the data were combined so that the youngest (3, 6, 9), the middle (4, 7, 10), and the oldest (5, 8, 11) children were grouped together. The data for this combined group were then analyzed. The results are presented in Table 2.

TABLE 2

Observed and Expected Frequencies of Interactions
Initiated by Children to Other Children in Laboratory School Setting

Classroom Composition	Number of Interactions Initiated by Age				Chi Square
	Youngest	Middle	Oldest	Total	
3-4-5 yr. olds	20 (33)[1]	73 (114)	242 (188)	335	35.38*
6-7-8 yr. olds	37 (38)	73 (94)	143 (121)	253	8.72
9-10-11 yr. olds	56 (84)	89 (83)	75 (53)	220	18.51*
All ages combined Y-M-O[2]	113 (170)	235 (291)	460 (347)	808	66.69*

[1]Numbers enclosed in parentheses are expected values

[2]Y = Youngest, M = Middle and O = Oldest

* $p < .01$

Differences in the observed and expected number of initiated interactions were found for the 3-4-5 year olds group, for the 9-10-11 year old group and when all the groups were combined. No difference in the observed and expected number of initiated interactions was found for the 6-7-8 year old group.

Most of the multiage classrooms in the suburban school setting had two ages (grades) combined. Five classrooms had three ages combined (8, 9 and 10 year olds). The findings for classrooms with two ages combined are presented in Table 3 and the findings for the classrooms with three ages combined are presented in Table 4.

TABLE 3

Observed and Expected Frequencies of Interactions
Initiated by Children to Other Children in Suburban School Setting
(2 Ages Combined)

Classroom Composition	Number of Interactions Initiated by Age: Youngest	Oldest	Total	Chi Square
6 - 7 yr. olds (Grades 1 & 2)	50 (66)[1]	96 (80)	146	7.08*
8 - 9 yr. olds (Grades 3 & 4)	97 (86)	65 (76)	162	3.00
9 -10 yr. olds (Grades 4 & 5)	35 (44)	87 (78)	122	2.88
All ages combined Youngest-Oldest	182 (189)	248 (241)	430	0.46

[1]Numbers enclosed in parentheses are expected values

*$p < .01$

TABLE 4

Observed and Expected Frequencies of Interactions
Initiated by Children to Other Children in Suburban School Setting
(3 Ages Combined)

Classroom Composition	Number of Interactions Initiated by Age: Youngest	Middle	Oldest	Total	Chi Square
8-9-10 yr. olds (Grades 3, 4 & 5)	83 (81)[1]	78 (71)	59 (68)	220	1.93

[1]Numbers enclosed in parentheses are expected values

A difference in the observed and expected number of initiated interactions was found for the 6-7 year old classroom combination. It should be noted that the chi square value for the classroom is 7.08. This value is very close to the chi square value for one degree of freedom at the .01 level of significance which is 6.64. No difference in the observed and expected number of initiated interactions was found for any of the other age combinations in this setting.

An examination of the observed and expected frequencies recorded in Tables 2-4 reveal some interesting variations between the two settings. In the laboratory school, where three age groupings were combined in each classroom studied, the older children consistently initiated interactions to other children more frequently than would be expected. This pattern tended to hold true for the children in the middle age grouping as well. On the other hand, the younger children consistently initiated interactions to other children less frequently than would be expected.

In the suburban school setting, few differences were found in the number of observed and expected interactions initiated by children of various ages. Even in the two classrooms where differences in observed and expected number of initiated interactions were found, the results are not consistent. In the 6-7 year old group, the older children initiated interactions to other children more frequently than would be expected and the younger initiated

interactions less frequently than would be expected. However, the reverse was true for the 8-9 year old group. It is also interesting that no differences in the observed and expected number of initiated interactions were found when three ages were combined into one classroom.

Is there a difference in the proportion of interactions initiated by children of various ages to the teacher in multiage classrooms?

This question differs from the first question in that it examines the student-to-teacher interactions rather than student-to-student interactions. Day and Hunt (1975) found no difference between the observed and expected frequencies of student-to-teacher interactions for 4, 5 and 6 year olds. The data analysis results from the laboratory school setting are presented in Table 5. The findings from the suburban school setting are presented in Tables 6 and 7. Table 6 contains the results for classrooms composed of two ages; Table 7, the results for classrooms composed of three ages.

TABLE 5

Observed and Expected Frequencies of Interactions Initiated by Children to the Teacher in Laboratory School Setting

Classroom Composition	Number of Interactions Initiated by Age				Chi Square
	Y	M	O[1]	Total	
3-4-5 year olds	18 (15)[2]	52 (50)	77 (82)	147	0.98
6-7-8 year olds	6 (13)	29 (33)	53 (42)	88	7.14
9-10-11 year olds	49 (47)	31 (46)	42 (29)	122	10.80*
All ages combined Y-M-O	73 (75)	112 (128)	172 (154)	357	4.16

[1]Y = Youngest, M = Middle and O = Oldest

[2]Numbers enclosed in parentheses are expected values.

*$p < .01$

TABLE 6

Observed and Expected Frequencies of Interactions Initiated by Children to the Teacher in Suburban School Setting (2 Ages Combined)

Classroom Composition	Number of Interactions Initiated by Age: Youngest	Oldest	Total	Chi Square
6-7 year olds (Grades 1 & 2)	25 (32)[1]	44 (38)	69	2.48
8-9 year olds (Grades 3 & 4)	54 (51)	42 (45)	96	0.38
9-10 year olds (Grades 4 & 5)	33 (25)	36 (44)	69	4.01
All ages combined Youngest-Oldest	112 (103)	122 (131)	234	1.40

[1]Numbers enclosed in parentheses are expected values.

TABLE 7

Observed and Expected Frequencies of Interactions Initiated by Children to the Teacher in Suburban School Setting (3 Ages Combined)

Classroom Composition	Number of Interactions Initiated by Ages: Y	M	O[1]	Total	Chi Square
8-9-10 year olds (Grades 3, 4 & 5)	29 (35)[2]	35 (30)	31 (30)	95	1.90

[1]Y = Youngest, M = Middle and O = Oldest

[2]Numbers enclosed in parentheses are expected values

No differences were found in the observed and expected number of interactions initiated by children of various ages to the teacher in any of the multiage grouping arrangements with one exception. Only the interactions of the 9, 10 and 11 year olds in the laboratory school setting produced a significant difference and this chi square value (10.80) was close to the chi square value for one degree of freedom at the .01 level of significance. These results support the results reported in Day and Hunt's (1975) article. It would appear that combining children of different ages in a classroom does not result in children of any particular age dominating the teacher's attention.

Do children of each age in multiage classrooms interact with other children across age groups?

The interactions initiated by children of each age were analyzed separately to see if children of each age initiated interactions across age groups. For example, the interactions initiated by 3 year olds in classrooms composed of 3, 4 and 5 year olds were analyzed to see if their conversation was directed to other children at random. If these 3 year olds directed their conversation mainly at other 3 year olds, there would be high interaction within the age group. Day and Hunt (1975) found high interaction within age groups and low interaction between age groups in classrooms composed of 4, 5 and 6 year olds. The findings for the current study are reported in Tables 8, 9 and 10.

TABLE 8

Observed and Expected Frequencies of Interactions
Directed to Children by Ages in Laboratory School Setting

Interactions Initiated By	Classroom Composition	Interactions Directed To Y	M	O[1]	Total	Chi Square
3 yr. olds	3-4-5 yr. olds	0 (2)[2]	13 (7)	7 (11)	20	8.60
4 yr. olds	3-4-5 yr. olds	7 (7)	32 (25)	34 (41)	73	3.16
5 yr. olds	3-4-5 yr. olds	3 (24)	35 (81)	201 (134)	239	78.00*
6 yr. olds	6-7-8 yr. olds	13 (5)	16 (14)	8 (18)	37	18.64*
7 yr. olds	6-7-8 yr. olds	19 (11)	20 (27)	34 (35)	73	7.66
8 yr. olds	6-7-8 yr. olds	13 (22)	32 (54)	102 (71)	147	26.18*
9 yr. olds	9-10-11 yr. olds	28 (21)	18 (21)	10 (14)	56	3.90
10 yr. olds	9-10-11 yr. olds	17 (34)	26 (33)	45 (21)	88	37.41*
11 yr. olds	9-10-11 yr. olds	12 (29)	42 (28)	21 (18)	75	17.47*
Y	All ages combined	41 (24)	47 (41)	25 (48)	113	23.94*
M	All ages combined	43 (49)	78 (84)	113 (101)	234	2.59
O	All ages combined	28 (97)	109 (166)	324 (198)	461	148.84*

[1]Y = Youngest, M = Middle and O = Oldest

[2]Numbers enclosed in parentheses are expected values

*$p < .01$

TABLE 9

Observed and Expected Frequencies of Interactions
Directed to Children by Ages in Suburban School Setting
(2 Ages Combined)

Interactions Initiated By	Classroom Composition	Interaction Directed To: Y	Interaction Directed To: O[1]	Total	Chi Square
6 yr. olds (Grade 1)	6-7 yr. olds (Grades 1 & 2)	27 (23)[2]	23 (27)	50	1.29
7 yr. olds	6-7 yr. olds	33 (43)	63 53	96	4.21
8 yr. olds (Grade 3)	8-9 yr. olds (Grades 3 & 4)	56 (51)	40 (45)	96	1.05
9 yr. olds (Grade 4)	8-9 yr. olds	31 (34)	33 (30)	64	0.56
9 yr. olds	9-10 yr. olds (Grades 4 & 5)	14 (13)	21 (22)	35	0.12
10 yr. olds (Grade 5)	9-10 yr. olds	26 (31)	61 (56)	87	1.25
Y	All ages combined	97 (80)	84 (101)	181	6.47
O	All ages combined	90 (109)	157 (138)	247	5.93

[1] Y = Youngest and O = Oldest

[2] Numbers enclosed in parentheses are expected values

TABLE 10

Observed and Expected Frequencies of Interactions Directed to Children by Ages in Suburban School Setting (3 Ages Combined)

Interactions Initiated By	Classroom Composition	Interaction Directed To: Y	M	O[1]	Total	Chi Square
8 yr. olds (Grade 3)	8-9-10 yr. olds (Grades 3, 4 & 5)	40 (31)[2]	32 (26)	11 (26)	83	12.65*
9 yr. olds (Grade 4)	8-9-10 yr. olds	38 (28)	33 (25)	6 (24)	77	19.63*
10 yr. olds (Grade 5)	8-9-10 yr. olds	18 (23)	11 (19)	32 (19)	61	13.35*

[1]Y = Youngest, M = Middle and O = Oldest

[2]Numbers enclosed in parentheses are expected values.

*$p < .01$

In the laboratory school, the 3 year olds and the 4 year olds in classrooms composed of 3, 4 and 5 year olds directed their conversation at random to other children. This was also true for 7 year olds in classrooms composed of 6, 7 and 8 year olds and for 9 year olds in classrooms composed of 9, 10 and 11 year olds. When all ages were combined into youngest, middle and oldest, the middle age grouping directed their conversation at random to other children. The oldest children in all of these multiage grouping configurations did not interact randomly across age groups. An examination of the observed and expected frequencies for the oldest children reveals high interaction within age groups and low interaction between age groups.

In the suburban school setting, children at each age level in classrooms composed of only two age combinations directed their conversation at random across the two ages. However, this was not true for the classrooms composed of 8, 9 and 10 year olds where none of the age groups directed their conversation at random across age. Again there was high interaction within age groups and low interaction between age groups for classrooms composed of 3 ages.

Can the interactions between children be classified into definable types?

As already indicated, one of the arguments for multiage grouping is the mutual aid which children give to each other (Ridgway & Lawton, 1969). Older children help the younger children thus providing them with "instruction." In the current study, an attempt was made to classify the interactions of children in some meaningful way which would reflect the giving and receiving of advice/assistance. A three category classification system was designed and the categories were designated as dominant interactions, submissive interactions and neutral interactions. The definitions for these three categories were presented under the Data Collection Procedures section of this report (Page 12).

Four judges were used to classify the recorded interactions between children into the defined categories. If all judges or three of the four judges agreed on a categorization, the interaction was labeled accordingly. Any other configuration of the categorizations made by the judges for an interaction was considered unclassifiable. It can be seen from Table 11

that 20% of the interactions were unclassifiable.

TABLE 11

Number and Percentage of Classifiable and Unclassifiable Interactions by Setting and Classroom Composition

Setting / Classroom Composition	Number (%) of Interactions				
	Total	Classifiable		Unclassifiable	
Laboratory School Setting					
3-4-5 yr. olds	339	277	(82%)	62	(18%)
6-7-8 yr. olds	257	203	(79%)	54	(21%)
9-10-11 yr. olds	226	183	(81%)	43	(19%)
Combined	822	663	(81%)	159	(19%)
Suburban School Setting					
6-7 yr. olds (Gr. 1 & 2)	146	121	(83%)	25	(17%)
8-9 yr. olds (Gr. 3 & 4)	161	134	(83%)	27	(17%)
9-10 yr. olds (Gr. 4 & 5)	122	91	(75%)	31	(25%)
8-9-10 yr. olds (Gr. 3, 4 & 5)	219	173	(79%)	46	(21%)
Combined	648	519	(80%)	129	(20%)
Combined Settings	1470	1182	(80%)	288	(20%)

The unclassifiable interactions were examined. It can be seen from Table 12 that the greatest confusion among judges was between the dominant and neutral interaction categories.

TABLE 12

Number and Percentage of Unclassifiable Interactions by Configurations

Configuration	Number of Interactions with Configuration	Percentage of Interactions with Configuration
DDNN[1]	153	53%
SSNN	68	24%
DDSS	6	2%
Mixed[2]	61	21%
Total	288	100%

[1]Letters in the four letter configuration refer to the categories individual judges assigned an interaction. D = Dominant Interaction S = Submissive Interaction and N = Neutral Interaction

[2]Configurations in which all three categories were utilized by judges to classify an interaction

The inconsistency of the judges surrounding most of these unclassifiable interactions seems to center on two types of missing information: the voice inflection associated with the interaction and the conversational setting associated with the interaction. The differential interpretation which the judges attached to either or both of these types of information in lieu of the actual information resulted in mixed categorizations of these interactions by the judges. For example, the judges were divided in their classification of the following interaction (SSNN):

Initiator: "I don't want to play this."
Respondent: "All right, when someone gets Numo, we'll stop."

The initiator in this example could be requesting permission to leave the game. The respondent may, in turn, be giving the conditions under which the initiator may leave. This would result in a submissive interaction (S→D). However, it could be that the initiator is simply making an announcement that he/she no longer wishes to play the game and the respondent is, in turn, agreeing with the initiator. This would produce a neutral interaction. The interpretation of the voice inflections of the children in this exchange determined the resulting categorization by the judges.

The next example is one in which information about the conversational setting was needed. The four judges categorized this interaction as DDSS.

Initiator: "What is a homonym for break? It's in a car."
Respondent: "Stop."

The conversational setting may be one in which one child is "teaching" another child. In this situation the initiator is quizzing the respondent and the respondent supplies an answer. This would result in a dominant interaction. However, it might be that the initiator is puzzled about an answer and is asking for assistance which the respondent supplies. This would result in a submissive interaction. The previous conversation between these two children is necessary to interpret this interaction as dominant or submissive.

Some interactions resulted in complete confusion by

the judges. The judges categorized the following example as DSNN.

Initiator: "Mary, I'll tell you the answer to that if you want?"
Respondent: (Negative headshake)

The initiator has provided the confusion in this exchange because he/she appears at first to be giving Mary unsolicited advice/assistance but ends the comment by asking for permission to help. The interaction may have been interpreted as D→D resulting in a neutral interaction. On the other hand, it could be interpreted as S→D or possibly S→N resulting in a submissive interaction. One judge apparently interpreted the interaction as D→N resulting in a dominant interaction.

It appears that most of the disagreements among judges on categorizing interactions occurred because the printed words for these verbal exchanges provided insufficient information. Sometimes the intent of the verbal exchanges between two children needed interpretation. Interpretation of these interactions were mostly dependent upon two missing types of information: the voice inflections of the children and/or the conversational setting (previous conversation between these two children which related to the interaction being interpreted). While there appears to be some problems in classifying the interactions into the three defined types presented in this study, the schema does seem to hold promise as a classification system.

Is there a difference in the proportion of interaction types initiated by various aged students to other students in multiage classrooms?

This question examines whether the older children in a multiage classroom are more frequently giving advice/assistance than the younger children and whether the younger children are more frequently requesting advice/assistance than the older children. Only those interactions between children which were classifiable were used to analyze these data. The findings for the laboratory school setting are presented in Table 13 and the findings for the suburban school setting are presented in Table 14.

TABLE 13

Contingency Tables for Types of Interactions Initiated by Children in Laboratory School Setting

Classroom Composition Age	Type of Interaction						Total	Chi Square
	Dominant		Submissive		Neutral			
3-4-5 yr. olds	79		71		127		277	3.50
3 yr. olds	4	(5)[1]	7	(4)	6	(8)	17	
4 yr. olds	16	(17)	18	(16)	26	(27)	60	
5 yr. olds	59	(57)	46	(51)	95	(92)	200	
6-7-8 yr. olds	70		61		72		203	10.20
6 yr. olds	13	(10)	7	(9)	9	(10)	29	
7 yr. olds	9	(18)	21	(15)	22	(19)	52	
8 yr. olds	48	(42)	33	(37)	41	(43)	122	
9-10-11 yr. olds	36		69		78		183	4.78
9 yr. olds	5	(9)	20	(17)	21	(19)	46	
10 yr. olds	21	(16)	27	(30)	31	(34)	79	
11 yr. olds	10	(11)	22	(22)	26	(25)	58	
All ages combined	182		201		280		663	7.28
Youngest	22	(26)	34	(29)	39	(40)	95	
Middle	44	(52)	66	(57)	79	(80)	189	
Oldest	116	(104)	101	(115)	162	(160)	379	

[1]Numbers enclosed in parentheses are expected values

TABLE 14

Contingency Tables for Types of Interactions Initiated by Children in Suburban School Setting

Classroom Composition Age	Type of Interaction D	S	N[1]	Total	Chi Square
6-7 yr. olds (Gr. 1 & 2)	29	53	39	121	2.38
6 yr. olds	7(10)[2]	19(19)	17(14)	43	
7 yr. olds	22(19)	34(34)	22(25)	78	
8-9 yr. olds (Gr. 3 & 4)	41	47	46	134	5.30
8 yr. olds	22(26)	35(29)	27(29)	84	
9 yr. olds	19(15)	12(18)	19(17)	50	
9-10 yr. olds (Gr. 4 & 5)	27	39	25	91	2.44
9 yr. olds	7(8)	10(12)	10(7)	27	
10 yr. olds	20(19)	29(27)	15(18)	64	
All 2 age combinations	97	139	110	346	3.08
Youngest	36(43)	64(62)	54(49)	154	
Oldest	61(54)	75(77)	56(61)	192	
8-9-10 yr. olds (Gr. 3, 4, & 5)	52	70	51	173	7.95
8 yr. olds	19(20)	26(27)	21(19)	66	
9 yr. olds	13(18)	25(25)	23(18)	61	
10 yr. olds	20(14)	19(18)	7(14)	46	

[1]D = Dominant, S = Submissive and N = Neutral

[2]Numbers enclosed in parentheses are expected values

No differences were found between the observed and expected frequencies of interaction types for any of the age groupings. This was true regardless of the organizational structure (two or three ages grouped together) and regardless of the setting (laboratory school setting or suburban school setting). The older children were not "teaching" the younger children more frequently in these multiage classrooms than vise versa.

CONCLUSIONS

The purpose of this study was to analyze the verbal interaction of children assigned to multiage classrooms. Several factors were explored in the process of analyzing the verbal interactions of children. The first factor to be explored was whether children of one age dominated the classroom conversation in multiage classrooms. This study examined conversation directed to other children in the classroom and conversation directed to the teacher. Since children who have been in a particular multiage classroom for the second or third year might have more confidence than the children who are relative newcomers to this classroom setting, the older children in a multiage classroom might be expected to dominate the conversation. This study was conducted toward the end of the academic year so that those children new to a multiage classroom environment had sufficient time to adjust to this new learning environment. Analysis of the data produced mixed results when the amount of children's conversation which was directed to other children was explored. However, the results are consistent when the amount of children's conversation which is directed to the teacher is the issue under examination.

When two ages were grouped together in a classroom, few differences were found between the observed and expected number of interactions initiated by children of various ages to other children in the classroom. Even when differences were found, the results are close to the significance level designated for this study and the

results do not produce a consistent pattern, e.g., the older children dominating the conversation. However, when three ages were grouped together in a multiage classroom, a pattern began to emerge. In this classroom structure, the older children tended to initiate more interactions to other children than would be expected from their representation in the classroom. This pattern did not appear in the suburban setting where there were classrooms composed of 8, 9 and 10 year olds (grades 3, 4 and 5). No explanation can be offered for this one inconsistency. The only observable difference between the classroom arrangement of 8, 9 and 10 year olds and the other 3 age classroom combinations studied are the slightly larger average class size of the first arrangement, its public school setting, and its slightly different age arrangement.

In summary, when three ages were combined in a classroom, the older children tended to dominate the conversation directed to other children in the classroom. This tendency was not present when two ages were combined in a classroom. When interactions directed at the teacher were examined, only one difference was found between the observed and expected number of interactions initiated by various aged children. This finding is consistent for all of the multiage classroom arrangements and for both of the study settings. It is also consistent with the results from the Day and Hunt (1975) study. Combining children of different ages in classrooms does not result in any age dominating the teacher's attention.

Another factor explored by this study was whether children of each age interacted across age groups. Ridgway and Lawton (1969) argue that multiage grouping fosters a child's free interaction with other children of various ages. In the current study, each age in each multiage classroom arrangement was examined separately to see if the age under examination initiated conversation randomly across age.

When two ages were combined in a classroom, each of the two ages initiated conversation randomly across age. However, when three ages were combined in a classroom, interaction did not occur across age groups. This was most evident for the oldest and youngest children in these classrooms. It was usually children in the middle age grouping who initiated conversation randomly across ages when it did occur. The children in the middle age grouping were the only children in this arrangement who were never more than one year's difference in age from any of the other children. An examination of the observed and expected frequencies for these data reveals high interaction within age groups and low interaction between age groups. Hunt and Day (1975) reported similar results for multiage classrooms composed of 4, 5 and 6 year olds.

In summary, multiage classrooms composed of two ages combined resulted in random interaction across age groups. Multiage classrooms composed of three ages combined resulted in high interaction within age groups and low interaction between age groups. Only the children in the middle age

tended to interact randomly across age groups. It appears that grouping children of different ages together in a classroom can result in interaction across age groups. However, interaction across age groups will not necessarily occur when three ages are grouped together, particularly for the youngest and oldest children in this arrangement. Apparently when three ages are grouped together, teachers must provide a conducive climate and encourage interaction across age groups if it is to occur in this arrangement.

Finally, this study attempted to classify the interactions of children according to advice/assistance given or requested so that types of interactions could be examined in multiage classrooms. One of the arguments for multiage grouping presented by Ridgway and Lawton (1969) is the mutual aid which children give to each other. They particularly point out the beneficial effects of older children helping younger children and thereby contributing to the teaching/learning process in the classroom. Before this factor could be studied, the giving and receiving of assistance had to be defined in some measurable way. A classification system was developed to categorize the interactions of children into dominant (giving advice/assistance), submissive (requesting advice/assistance) and neutral (other types of verbal exchanges). The classification system was then tested to see if the interactions of children could be consistently classified. While there were some problems using the classification system, 80% of the children's

interactions were easily classifiable. The remaining 20% of the verbal exchanges produced classification problems. Two types of missing information appeared to cause most of the classification problems: the voice inflections associated with an interaction and the conversational setting associated with an interaction (previous conversation between two children related to the interaction being classified). Both of these types of information were absent when the judges were classifying interactions. For 80% of the interactions this information was unnecessary, but for the remaining 20% each judge had to interpret the voice inflections and/or the conversational setting without any information about them. The differential interpretations which the judges attached to either or both of these types of information in lieu of the actual information produced most of the confusion with the unclassifiable interactions. Perhaps the data should be collected using tape recording equipment. Each interaction could be presented to the judges on tape with other information related to the interaction included in the presentation. While there does seem to be some problems with this classification system, the schema does seem to have possibilities as a classification system.

The classifiable data were used to examine the types of interactions initiated by children of various ages. No differences were found between the observed and expected number of interactions types initiated by children of various ages. This finding was consistent for all of the multiage classroom arrangements and for both of the study

settings. Of course, the unclassifiable interactions might have had an effect on this finding if they could have been included. The large proportion of submissive and dominant interactions seems to indicate that children are giving mutual aid to one another. However, the older children are not giving advice/assistance more frequently than the younger children and, conversely, the younger children are not requesting advice/help more frequently than the older children. This may be a positive outcome of multiage grouping since children of any age feel comfortable giving help in areas in which they have expertise to children of any age in the classroom. It should be remembered, however, that classrooms composed of three age groupings have high interaction within age groups and low interaction between age groups. As a result much of the mutual aid is probably between children of the same age.

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APPENDIX A

LABORATORY SCHOOL SETTING

ANALYSIS OF THE VERBAL INTERACTIONS IN THE INDUSTRIAL ARTS CLASSROOM AND THE LUNCH ROOM

Laboratory School Setting

Analysis of the Verbal Interactions in the Industrial Arts Classroom and the Lunch Room

As indicated in the body of this report, the laboratory school setting has two types of classroom teachers: family room teachers and interest area teachers. This study focuses on classrooms with family room teachers because these classrooms sustain very stable populations and emphasize similar curricular content. Interest area teachers teach a specialty, e.g., physical education, home economics, or art. Children are permitted to choose interest areas they wish to attend each day so the populations in these classrooms are very fluid.

The current researchers decided to collect data in one interest area and in the lunch room as a pilot study. Although the researchers had little control over the populations in these two settings, the settings did provide an opportunity to collect some unique data. Since children are free to choose the interest areas they wish to attend as well as their lunch room companions, these children also have more freedom in choosing classmates they wish to interact with. The data were collected in the industrial arts interest area. The industrial arts classroom and the lunch room were each observed on three separate occasions. The results of the data analysis for these two settings are presented below.

Industrial Arts Classroom

It was uncertain which ages would be present in the industrial arts classroom when it was observed. On each of the days observed, the same age groups were represented in this classroom. The children ranged in age from 6 to 11 years although no 9 year olds were present on any of the data collection days. This classroom provided an opportunity to study the interactions of children when five ages were grouped together. These five age groupings spanned six years.

The amount of children's conversation which was directed to other children and the amount of children's conversation which was directed to the teacher was examined. The results of the data analysis are presented in Tables A-1 and A-2.

TABLE A-1

Observed and Expected Frequencies of Interactions Initiated by Children to Other Children in the Industrial Arts Interest Area

Age	Observed Number of Interactions	Expected Number of Interactions	Chi Square
6 year olds	5	13	
7 year olds	15	30	
8 year olds	50	19	
10 year olds	6	19	
11 year olds	16	11	
Total	92	92	74.17*

*$p < .01$

TABLE A-2

Observed and Expected Frequencies of Interactions Initiated by Children to the Teacher in the Industrial Arts Interest Area

Age	Observed Number of Interactions	Expected Number of Interactions	Chi Square
6 year olds	6	10	
7 year olds	6	22	
8 year olds	32	15	
10 year olds	4	15	
11 year olds	22	8	
Total	70	70	65.07*

*$p < .01$

Differences were found in the observed and expected number of interactions initiated by children to other children and to the teacher. The first part of this finding (interactions to other children) is consistent with the findings for three ages grouped together as reported in the body of this report. However, the second part of this finding (interactions to the teacher) is inconsistent with the findings reported in the body of the report.

The second factor explored by this study was whether children of each age interacted randomly across age groups. Unfortunately, there were not sufficient data available to analyze each age separately. It was possible to analyze the data if some of the age groups were combined. The two youngest ages (6 and 7 year olds) were combined and the two oldest ages (10 and 11 year olds) were combined. This left the 8 year olds for the middle age grouping. The data were then analyzed and the results are presented in Table A-3.

TABLE A-3

Observed and Expected Frequencies of Interactions Directed to Children by Ages in the Industrial Arts Interest Area

Interactions Initiated By	Interactions Directed To				Chi Square
	6-7 yr. olds	8 yr. olds	10-11 yr. olds	Total	
6-7 yr. olds	6 (9)[1]	10 (4)	4 (7)	20	11.29*
8 yr. olds	5 (21)	28 (11)	15 (16)	48	38.53*
10-11 yr. olds	0 (10)	16 (5)	6 (7)	22	34.34*

[1]Numbers enclosed in parentheses are expected values.

*$p < .01$

None of these age combinations interacted randomly across age groups. This finding is also consistent with the findings for classrooms composed of three age groupings reported in the body of this report.

The last factor to be examined was the interaction types initiated by children of various ages. There were, again, insufficient data to analyze the data as planned. The ages were combined into the same groupings as described above and then analyzed. The results are presented in Table A-4.

TABLE A-4

Contingency Table for Types of Interactions Initiated by Children in the Industrial Arts Classroom

Age	Type of Interaction						Total	Chi Square
	Dominant		Submissive		Neutral			
6-7 yr. olds	5	(5)[1]	6	(4)	7	(9)	18	
8 yr. olds	13	(9)	2	(7)	14	(13)	29	
10-11 yr. olds	2	(6)	8	95)	10	(9)	20	
Total	20		16		31		67	11.45

[1]Numbers enclosed in parentheses are expected values.

No difference was found between the observed and expected number of interaction types initiated by children of various age groupings. This finding is also consistent with those findings related to this factor reported in the body of the report.

It is difficult to draw conclusions from these limited data. This classroom did provide the opportunity to examine the interactions of children when five ages, spanning six years, were grouped together. Unfortunately, the data could not always be analyzed as planned. The limited number of times the classroom was observed and the large number of ages present in the classroom sometimes produced insufficient data for analysis. As a result several of the ages had to be combined so that the data could be analyzed. The results of most of the data analysis are

consistent with the results reported in the body of this study. The one major finding which is inconsistent with the other findings reported in this study is the one related to interactions directed to the teacher. For the industrial arts classroom, the proportion of interactions directed to the teacher were not random across ages.

Even more interesting than the results of the data analysis are some patterns which emerge from examination of the raw data. These patterns are not present in the data from the main focus of this study. The patterns seem to be centered around the middle age grouping (the 8 year olds). While these 8 year olds did not represent a disportionate number of children present in the classroom (21%), there were a disportionate number of interactions initiated by them to other children and, to a lesser extent, to the teacher (See Tables A-1 and A-2). These 8 year olds dominated the classroom conversation.

These 8 year olds also displayed high interaction within their own age group as would be expected from the other results of this study. However, both the youngest children (6 and 7 year olds) and the oldest children (10 and 11 year olds) directed a disportionate number of interactions to these 8 year olds rather than displaying high interactions within their own age groupings as expected (See Table A-3). Although the results of the data analysis were not significant at the .01 significance level, these 8 year olds also tended to initiate a disportionate number of dominant interactions

and initiated fewer than expected submissive interactions (See Table A-4).

The attendance structure for interest areas made it possible for different groups of children to be present each time this classroom was observed. It is not known if these were the same or different groups of children present each time this classroom was observed. Although it is not known if these were the same or different groups of children, it appears that the 8 year olds were the magnetic element in this classroom. Of course the children in the middle age group were the closest in age to all the other children in the classroom. Because data collection for this interest area was very limited, it is possible that particular 8 year olds present in this classroom produced these patterns. More data needs to be collected in a variety of interest areas before any conclusions can be made.

Lunch Room

The lunch room presented some difficult data collection problems. Each observer stationed herself near a lunch room table to collect data. Each of these tables had unique age combinations seated at it. Since the lunch room was observed three times, the result was data for six different age combinations. Sometimes three ages were grouped together at a table and sometimes only two ages; however the ages never spanned more than three years. The population of children at any one table was also unstable since children tended to drift to the table as they got their lunches and

to drift from the table as they finished eating. Another problem was the very small number of children seated at a table.

The conversation at the tables presented problems as well. Children in the unstructured lunch room setting often talked for the sheer joy of making sound. This resulted in a large amount of nonsense conversation which was frequently not directed to anyone. Since conversation that was initiated by someone did not always produce a response, frequently no interaction, as defined by this study, occurred. Because of the problems associated with data collection in this setting, the data were not analyzed.

APPENDIX B

SUBURBAN SCHOOL SETTING

ANALYSIS OF THE VERBAL INTERACTIONS IN ART,

GYM AND SCIENCE CLASSES

Suburban School Setting

Analysis of the Verbal Interactions in Art, Gym and Science Classrooms

The children assigned to family room teachers provided the populations for the study described in the body of this report. These multiage classrooms were chosen because the children assigned to them spent the majority of their day with the family room teachers. In the suburban school setting, the children assigned to multiage classrooms also attend some specialized classes several times a week. The researchers decided to collect some data from these specialized classes as a pilot study. The specialized classes are gym, art and music; however the music classroom was eliminated from the pilot study because of the limited opportunities for interactions among children. Data were collected twice in art classrooms and once during a gym period. These classrooms were composed of two age combinations. The gym and one art class contained 7 and 8 year olds (grades 2 and 3); the other art class was composed of 8 and 9 year olds (grades 3 and 4).

One of the schools in this suburban school setting had a science class composed of ages 7, 8, 9 and 10 year olds (grades 2 through 5). Three multiage teachers were responsible for this science class which met for one hour a day for five or six weeks a semester. The teaching was rotated among the three teachers. It was decided to collect data in this science class because the class contained four ages grouped together.

The amount of children's conversation which was directed to other children was explored first. The data were analyzed and the results are presented in Table B-1.

TABLE B-1

Observed and Expected Frequencies of Interactions Initiated by Children to Other Children in the Specialty Classes

Specialty Class Age	Observed Number of Interactions	Expected Number Of Interactions	Total Interactions	Chi Square
Art/Gym			77	11.41*
Youngest[1]	33	20		
Oldest	44	57		
Science			145	6.46
7 year olds	1	7		
8 year olds	56	49		
9 year olds	53	51		
10 year olds	35	38		

[1]These classes were composed of either 7-8 year olds or 8-9 year olds.

*$p < .01$

A difference was found between the observed and expected number of interactions initiated by children to other children in the art/gym classes, however, no difference was found in the science class. This finding is somewhat inconsistent with the results reported in the body of this study. When two ages were combined in family rooms, the children tended to initiate conversation to other children randomly, however, the children in these art/gym classes did not initiate conversation randomly across age. Furthermore, the youngest children tended to dominate the classroom conversation in

the art/gym classes. In the laboratory school setting when children did not initiate conversation randomly, it was the oldest children who tended to dominate the classroom conversation. On the other hand, the children in the science class did initiate conversation randomly across ages which does not agree with the results reported for the laboratory school setting but does agree with the results reported for the suburban school setting. This is not surprising since the three science class teachers taught family rooms which were involved in this study. Many of the same children attended the science class.

The amount of children's conversation which was directed to the teacher was analyzed for these specialized classes and the results are presented in Table B-2.

TABLE B-2

Observed and Expected Frequencies of Interactions Initiated by Children to the Teacher in the Specialty Classes

Specialty Class Age	Observed Number of Interactions	Expected Number Of Interactions	Total Interactions	Chi Square
Art/Gym			34	1.36
Youngest[1]	12	9		
Oldest	22	25		
Science			88	18.21*
7 year olds	12	4		
8 year olds	32	30		
9 year olds	27	31		
10 year olds	17	23		

[1]These classes were composed of either 7-8 year olds or 8-9 year olds.

*$p < .01$

A difference was found between the observed and expected number of interactions initiated by children to the teachers in the science class but not to the teachers in the art/gym classes. The results for the art/gym classes are consistent with the results reported in the body of this report but the science class results are not. The younger children tended to dominate the conversation directed to the teacher in the science class.

Another factor explored in this study was whether children of each age interacted randomly across age groups. The results of the data analysis for these specialized classes are presented in Tables B-3 and B-4.

TABLE B-3

Observed and Expected Frequencies of Interactions Directed to Children by Ages in the Art/Gym Classes

Interactions Initiated By	Interactions Directed To			Chi Square
	Youngest	Oldest	Total	
Youngest Children[1]	11 (9)[2]	22 (24)	33	0.61
Oldest Children	14 (11)	30 (33)	44	1.09

[1]These classes are composed of either 7-8 year olds on 8-9 year olds.

[2]Numbers enclosed in parentheses are expected values.

TABLE B-4

Observed and Expected Frequencies of Interactions Directed to Children by Ages in the Science Class

Interactions Initiated By	Interactions Directed To					
	7 yr. olds	8 yr. olds	9 yr. olds	10 yr. olds	Total	Chi Square
7 yr. olds	1 (2)[1]	14 (12)	21 (13)	0 (9)	36	14.76*
8 yr. olds	0 (3)	27 (19)	26 (19)	2 (14)	55	10.29
9 yr. olds	0 (3)	32 (18)	19 (18)	1 (13)	52	25.02*
10 yr. olds	0 (2)	2 (12)	4 (12)	29 (9)	35	60.11*

[1]Numbers enclosed in parentheses are expected values.

*$p < .01$

In the art/gym classes, both the youngest and the oldest children interacted randomly across age groups. These findings are consistent with the results reported for the two age combinations in the body of this report. In the science class, only the 8 year olds interacted randomly across age groups and the chi square value was close to the chi square value for 3 degrees of freedom at the .01 significance level ($\chi' = 11.34$). These findings are also consistent with those reported in the body of this report.

The last factor to be examined by this study was the interaction types initiated by children of various ages. There were insufficient data available from the science class to analyze the data as planned, therefore, data for

the two youngest ages (7 and 8 year olds) were combined and then analyzed. The results of the data analysis are presented in Table B-5

TABLE B-5

Contingency Tables for Types of Interactions Initiated by Children in Specialty Classes

Specialty Class Age	Type of Interaction						Total	Chi Square
	Dominant		Submissive		Neutral			
Art/Gym	8		25		27		60	1.34
Youngest[1]	2	(3)[2]	13	(11)	10	(11)	25	
Oldest	6	(5)	12	(14)	17	(16)	35	
Science	23		55		41		119	15.37*
7-8 year olds	13	(10)	14	(22)	22	(17)	49	
9 year olds	9	(8)	20	(20)	14	(15)	43	
10 year olds	1	(5)	21	(13)	5	(9)	27	

[1]These classes were composed of either 7-8 year olds or 8-9 year olds.

[2]Numbers enclosed in parentheses are expected values

*$p < .01$

No difference was found between the observed and expected number of interaction types initiated by children of various ages in the art/gym classes. This finding is consistent with the results reported in the body of this study. However, a difference was found between the observed and expected number of interaction types initiated by children of various ages in the science class. Strangely, the oldest children tended to initiate more submissive interactions and fewer dominant interactions than would be expected from their representation in the class. The

opposite tendencies were found for the youngest children.

It should be recognized that the above results are based on very limited data. The pilot study was conducted in order to discover what data collection problems needed to be overcome in specialized classes. The pilot study also provided the opportunity to see if the findings from specialized classes were consistent with the findings reported in the body of this report. Finally, the pilot study provided the opportunity to examine multiage classrooms composed of more than three age combinations. Most of the findings from the pilot study are consistent with findings reported in the body of this report. Those results which are inconsistent can probably be attributed to the limited data available for the pilot study.

APPENDIX C

NUMBER OF CHILDREN PRESENT

IN EACH CLASSROOM WHEN OBSERVED

LABORATORY SCHOOL SETTING

Number of Children Present in Each Classroom When Observed

Classroom Composition	Classrooms Observed	No. of Times Observed	No. of Children in Classrooms			
			First/Fourth Observation	Second/Fifth Observation	Third Observation	Total
3-4-5 yr. olds						146
	Class 1	5	15	17	20	
			18	19		89
	Class 2	3	17	19	21	57
6-7-8 yr. olds						99
	Class 1	3	13	15	13	41
	Class 2	4	9	10	23	58
			16			
9-10-11 yr. olds						130
	Class 1	3	21	22	16	59
	Class 2	3	25	23	23	71
6-7-8-10-11 yr. olds						
	Industrial Arts	3	13	14	13	40

SUBURBAN SCHOOL SETTING

Number of Children Present in Each Classroom When Observed

Classroom Composition	Classrooms Observed	No. of Times Observed	No. of Children in Classrooms			Total
			First/Fourth Observation	Second/Fifth Observation	Third Observation	
6-7 yr. olds						82
	Class 1	2	24	23		47
	Class 2	1	20			20
	Class 3	1	15			15
8-9 yr. olds						144
	Class 1	3	25	24	24	73
	Class 2	3	27	18	26	71
9-10 yr. olds						143
	Class 1	3	21	21	23	65
	Class 2	3	28	25	25	78
8-9-10 yr. olds						303
	Class 1	2	56	25		81
	Class 2	2	27	24		51
	Class 3	2	30	30		60
	Class 4	1	29			29
	Class 5	2	56	26		82
7-8 or 8-9 yr. olds						74
	Art	2	24	26		
	Gym	1	24			
7-8-9-10 yr. olds						111
	Science	5	25	25	25	
			25	11		

APPENDIX D

DATA COLLECTION FORMS

Form A

Multi-Aged Grouping Study
Summary Sheet

Code No._____ Teacher_____

Date_____ Observer_____

Time_____

Number of Children in Room:

Age_____ No._____ Age_____ No._____

Age_____ No._____ Age_____ No._____

Age_____ No._____ Age_____ No._____

Number of Interactions Directed to Teacher:

Age_____ No._____ Age_____ No._____

Age_____ No._____ Age_____ No._____

Age_____ No._____ Age_____ No._____

Code_____

Form B

Multi-Aged Grouping Study

	Age	Comment
1. Initiator		
Respondent		
2. Initiator		
Respondent		
3. Initiator		
Respondent		
4. Initiator		
Respondent		
5. Initiator		
Respondent		
6. Initiator		
Respondent		
7. Initiator		
Respondent		
8. Initiator		
Respondent		

Form C
Multi-Age Grouping Study

Code No._____ AGE:

Kind of Interaction		Interaction	Directed to
	I: R:		
	I: R:		
	I: R:		
	I: R:		
	I: R:		
	I: R:		
	I: R:		
	I: R:		
	I: R:		
	I: R:		
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	I: R:		